Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

One-Step Synthesis of Novel Mesoporous three-dimensional GeO_2 and its lithium storage properties

Haiping Jia, Richard Kloepsch , Xin He, Juan Pablo Badillo, Martin Winter, Tobias Placke

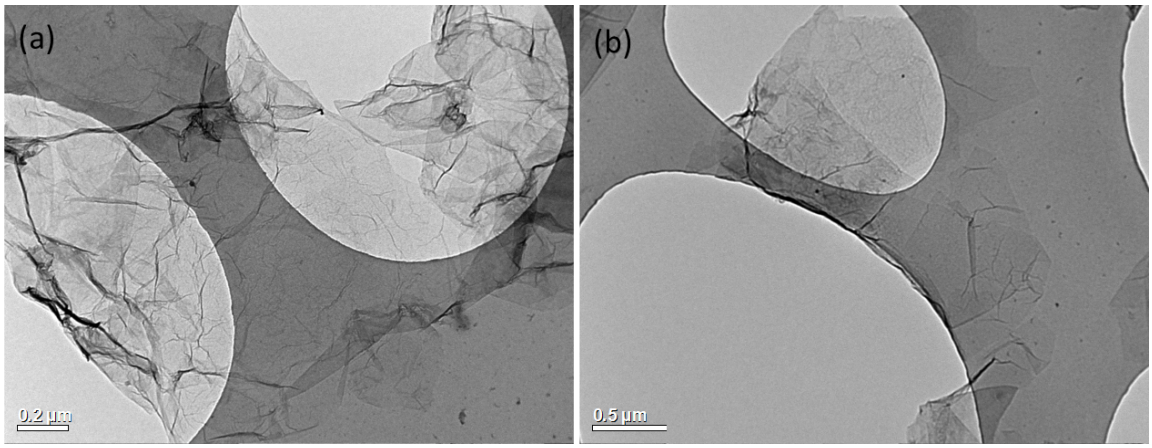

Figure S1. TEM images of graphene oxide.

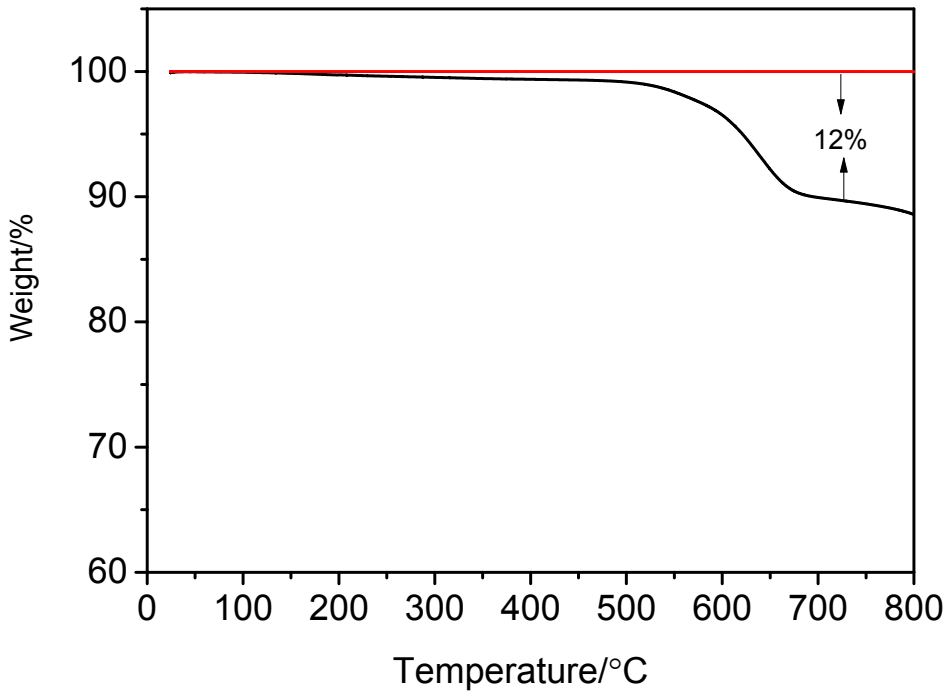

Figure S2. TGA curve of GeO_2/graphene composite.

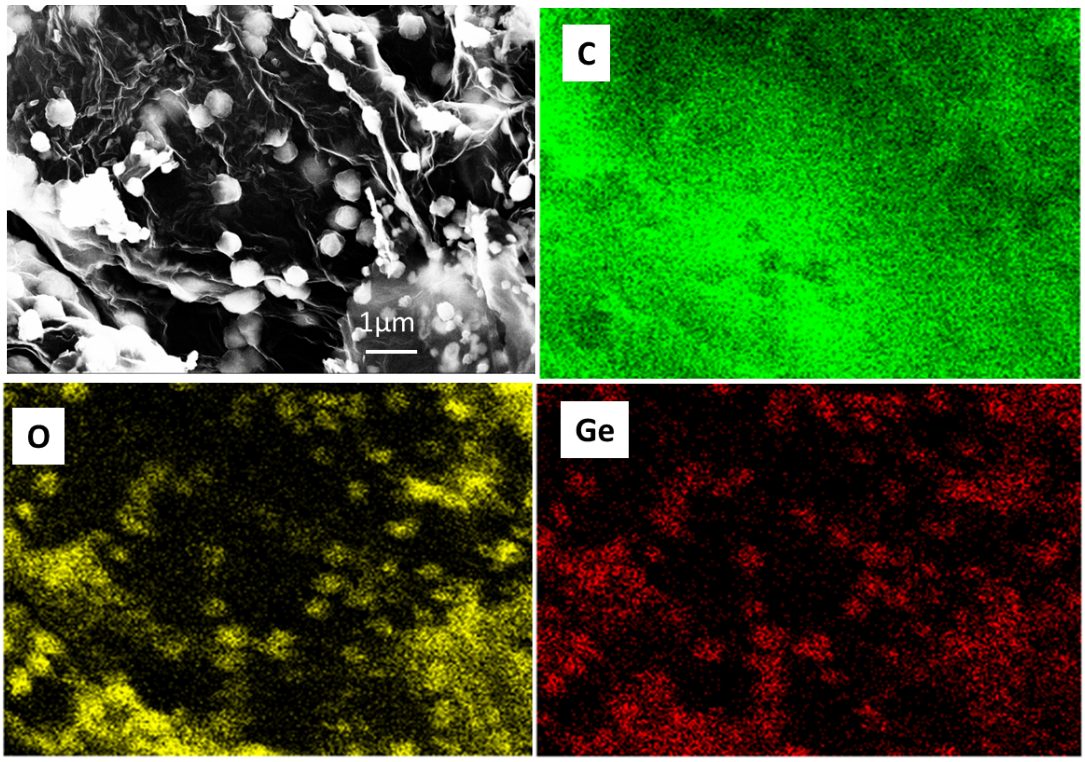

Figure S3. SEM image of b-GeO_2@graphene composite and the corresponding elemental C, Ge and O EDX maps.

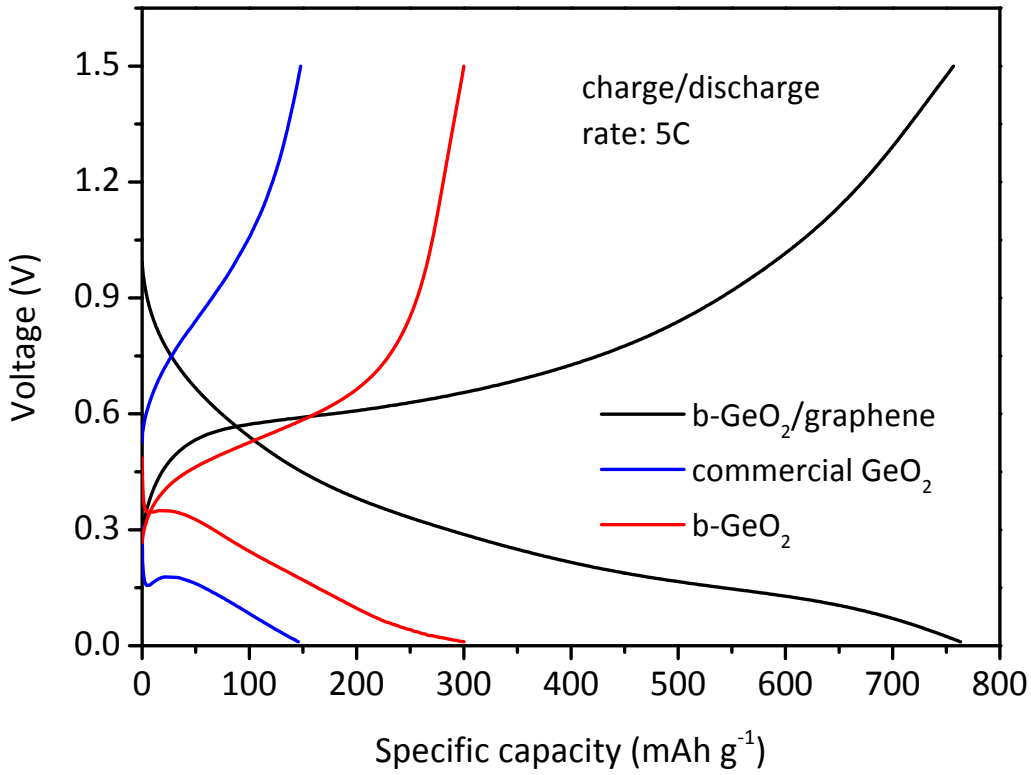

Figure S4. Representative voltage vs. specific capacity profiles of commercial GeO_2, b-GeO_2 and b-GeO_2/graphene at a charge/discharge rate of 5C.

Experimental section:

Preparation of graphene oxide*:* Graphene Oxide (GO) was synthesized from natural graphite fine powder by a modified Hummers method. Typically, 12 g of KNO_3 and 10 g natural graphite were added to 500 mL of concentrated H_2SO_4 (98%) at room temperature. The mixture was stirred for 10 minutes before slow addition of 60 g of $KMnO_4$. Then, the mixture was heated to 35 ℃ and stirred for 6 hours. Subsequently, 160 mL of distilled water was added dropwise under vigorous stirring, causing a quick rise in temperature to about 90 ℃. The slurry was stirred at this temperature for another 30 minutes. Afterwards, 400 mL of distilled water and 12 mL of H_2O_2 solution (30 wt.%) were added sequentially to dissolve insoluble manganese species. The resulting graphite oxide suspension was washed repeatedly in distilled water until the pH of the solution reached a constant value of about 5. As-synthesized graphite oxide was suspended in water to give a brown dispersion, which was subjected to dialysis to completely remove residual salts and acids. The purified graphite oxide suspensions were then dispersed in distilled water to create 0.5 wt.% dispersion. Exfoliation of graphite oxide to GO was achieved by ultrasonication of the dispersion for 30 minutes. The obtained brown dispersion was then subjected to 30 minutes of centrifugation at 4000 rpm to remove any unexfoliated graphite oxide.